

- 63 -

CLAIMS

1. A process for preparing metal carboxylates in the form of dry powder with the formula $M(RCOO)_2$, where M is the divalent metal cation of zinc (Zn^{2+}) or copper (Cu^{2+}), R can be H or a $CH_3(CH_2)_2$ - group, characterized in that it comprises the following stages:
 - i) Mixing a carboxylic acid ($RCOOH$) in stoichiometric proportions with a dry basic compound of the divalent metal, in the absence of solvents, which gives rise to an exothermic reaction in which water is produced as a by-product.
 - ii) Keeping said exothermic reaction stirred for a sufficient time for removal of the water, giving rise to a carboxylate of $Zn(II)$ or $Cu(II)$.
2. The process as claimed in claim 1, characterized in that it avoids the extra step of recovering the carboxylate of $Zn(II)$ or $Cu(II)$ that formed, by post-reaction treatments such as, among others, concentration, crystallization, separation by filtration, decanting or centrifugation and freeze-drying.
3. The process as claimed in claim 1, characterized in that it uses zinc oxide as the basic metal compound.
4. The process as claimed in claim 1, characterized in that it uses copper hydroxide as the basic metal compound.
5. The process as claimed in claim 1, characterized in that it uses formic acid as the carboxylic acid.
6. The process as claimed in claim 1, characterized in

that it uses butyric acid as the carboxylic acid.

7. The process as claimed in claims 1 to 6, characterized in that it is carried out with fast stirring of the carboxylic acid and the basic metal compound.
8. The process as claimed in claims 1 to 7, characterized in that stirring of the reacted product is maintained in the reactor-mixer itself, while hot, and the vapors are absorbed by the vacuum cleaning system, for the purpose of removing the water that formed.
9. The process as claimed in claims 1 to 8, characterized in that the molar ratio of carboxylic acid and metallic is approximately 2:1, it being possible to work with an excess of 3-6 wt.%, both of the metal compound and of the carboxylic acid.
10. The process as claimed in claims 1 to 9, characterized in that the basic metal compounds employed are used in the form of particles with size less than 6.5 mm.
11. The process as claimed in claims 1 to 10, characterized in that metal carboxylates are obtained with yields exceeding 80%.
12. The process as claimed in claims 1 to 11, characterized in that the exothermic reaction is stirred for 1-5 minutes in stage ii).
13. The process as claimed in claims 1 to 12, characterized in that the mixing in stage i) is carried out in a range of 1500-3000 rpm and in stage ii) at 200-400 rpm, and supplementing the stirring in said stage ii) with delumping intensifier turbines which operate in ranges of the order of 1500-3000 rpm.

14. The process as claimed in claims 1 to 13, characterized in that stage i) takes 2-30 seconds.
15. The process as claimed in claims 1 to 14, characterized in that the mixing stage i) takes place in a different reactor to stage ii).
16. The process as claimed in claims 1 to 15, characterized in that in stage ii), in addition to water, the unreacted organic acids are removed.
17. Zinc butyrate, obtainable as claimed in the process of claims 1 to 16, characterized in that it comprises a particulate powder with a purity greater than 90%.
18. Copper butyrate, obtainable as claimed in the process of claims 1 to 16, characterized in that it comprises a particulate powder with a purity greater than 90%.
19. Zinc formate, obtainable as claimed in the process of claims 1 to 16, characterized in that it comprises a particulate powder with a purity greater than 85%.
20. Copper formate, obtainable as claimed in the process of claims 1 to 16, characterized in that it comprises a particulate powder with a purity greater than 85%.
21. The use of the zinc butyrate of claim 17 as an animal feed supplement for promoting growth.
22. The use of the copper butyrate of claim 18 as an animal feed supplement for promoting growth.
23. The use of the zinc formate of claim 19 as an animal feed supplement for promoting growth.
24. The use of the copper formate of claim 20 as an

animal feed supplement for promoting growth.

25. The process as claimed in claim 16, characterized in that the unreacted organic acids are recovered by a system of condensation and combination with soluble sodium salts or calcium salts that can be precipitated.
26. The process as claimed in claim 1, characterized in that a previously prepared aminoate is poured onto the carboxylate that has formed and the water is removed, giving rise to a dry metal carboxylate-aminoate.
27. The process as claimed in claim 26, characterized in that the carboxylate is zinc(II) formate or copper(II) formate.
28. The process as claimed in claim 26, characterized in that the aminoate is zinc(II) glycinate, copper(II) glycinate, zinc(II) methioninate or copper(II) methioninate.
29. The process as claimed in claims 26 to 28, characterized in that the carboxylate is zinc(II) formate and the aminoate is zinc(II) glycinate.
30. The process as claimed in claims 26 to 28, characterized in that the carboxylate is zinc(II) formate and the aminoate is zinc(II) methionate.
31. The process as claimed in claims 26 to 28, characterized in that the carboxylate is copper(II) formate and the aminoate is copper(II) glycinate.
32. The process as claimed in claims 26 to 28, characterized in that the carboxylate is copper(II) formate and the aminoate is copper(II) methioninate.
33. The process as claimed in any one of the claims 26 to 32, characterized in that the ratio of the

percentages by weight of carboxylate and aminoate comprises a range from 30/70 to 70/30.

34. The process as claimed in any one of the claims 26 to 33, characterized in that the removal of water is accomplished by adding an absorbent and heating in the range 90-98°C.
35. The process as claimed in in claim 34, characterized in that the dry product obtained undergoes an additional process of grinding.
36. The process as claimed in any one of the claims 26 to 33, characterized in that the removal of water is accomplished by submitting the mixture of carboxylate and aminoate to vacuum conditions and stirring with delumping intensifier turbines at a speed of 1500-3000 rpm.
37. The process as claimed in claim 36, characterized in that the temperature is maintained between 80°C and 130°C.
38. The use of the zinc(II) formate-glycinate obtained as claimed in claim 29 as an animal feed supplement for promoting growth.
39. The use of the zinc(II) formate-methioninate obtained as claimed in claim 30 as an animal feed supplement for promoting growth.
40. The use of the copper(II) formate-glycinate obtained as claimed in claim 31 as an animal feed supplement for promoting growth.
41. The use of the copper(II) formate-methioninate obtained as claimed in claim 32 as an animal feed supplement for promoting growth.
42. The process as claimed in claim 1, characterized in that prior to mixing with the metal base, a hydroxy analog of methionine is poured onto the carboxylic

acid, giving rise to a carboxylate-methioninate hydroxy analog of divalent metal.

43. The process as claimed in claim 42, characterized in that the carboxylic acid, the hydroxy analog of methionine and the metal base are mixed in the molar proportions 2:2:2.
44. The process as claimed in claims 42 and 43, characterized in that mixing of the carboxylic acid and the hydroxy analog of methionine is carried out in a first reactor different from that for addition of the basic metal compound.
45. The process as claimed in claim 44, characterized in that the second reactor already contains the basic metal compound when the mixture of carboxylic acid and hydroxy analog of methionine is added.
46. The process as claimed in claim 45, characterized in that the basic metal compound, the carboxylic acid and the hydroxy analog of methionine are mixed at a speed of 200-600 rpm.
47. The process as claimed in claims 42 to 46, characterized in that the removal of water is promoted by heating the mixture in the range 80-130°C.
48. The process as claimed in claims 42 to 46, characterized in that the removal of water from the mixture is accomplished by subjecting the mixture of basic metal compound, carboxylic acid and hydroxy analog of methionine to vacuum conditions and stirring with delumping intensifier turbines at a speed of 1500-3000 rpm.
49. The process as claimed in claims 42 to 48, characterized in that the metal carboxylate is zinc(II) formate or copper(II) formate.

50. The process as claimed in claims 42 to 48, characterized in that the metal base is zinc(II) oxide or copper(II) hydroxide.
51. The process as claimed in claims 42 to 50, characterized in that the metal carboxylate is zinc(II) formate and the metal base is zinc(II) oxide.
52. The use of the formate-methioninate hydroxy analog of zinc obtained as claimed in claim 51 as an animal feed supplement for promoting growth.